it. More importantly for present purposes, because DCF contains *no* preliminary step to measure relative risk, the stock price used in the DCF contains *all* the information the model can provide on relative risk. If the DCF model is to have any hope of reaching the right answer, then, the analyst must be sure *in advance* that he or she has picked a sample of securities that are of comparable risk to the industry in question.

The standard solution to this problem, and the one the Commission uses elsewhere, is to pick a sample of stocks from the industry itself. In the case of the cable industry, because there is no way to specify the cash flow forecasts embedded in cable stock prices (because there is no projected dividend series), the DCF model cannot be applied. Moreover, since the DCF model *per se* makes *no* assumptions about the relative risk of the stocks analyzed, reliance on a DCF analysis of stocks of a surrogate group based on mere judgments and intuitions about relative risk introduces a large element of arbitrariness that can significantly bias the end result. This is particularly true here because any such sample must be comprised of dividend paying stocks, which, all else equal, are *less* risky than stocks that do not pay dividends. Therefore, there is no reasonable alternative to abandonment of the DCF approach in cable regulation, at least until the industry settles into a dividend-paying pattern that will permit use of the model.

2. Risk Premium or Risk Positioning Methods

The definition of the cost of capital stated above recognizes a fundamental trade-off between risk and return. The higher the risk, the higher the cost of capital required to compensate for that risk. This leads to what is sometimes called the risk positioning or risk premium method to estimate the cost of capital. This method estimates the cost of capital as the sum of a current interest rate and a risk premium, and so reflects the underlying risk-return trade-off. Firms with higher risk have a

higher cost of capital, and firms with lower risk have a lower cost of capital, other things being equal.

We rely primarily on the CAPM and a variant of the CAPM in this report. The CAPM is literally the textbook model for measuring the cost of equity for companies.[16] It is used by practitioners on Wall Street and in corporations around the world. Harry M. Markowitz won a Nobel Price in economics in 1990 for his earlier discovery of the importance of undiversifiable risk in portfolio selection. This discovery is the basis of the risk measure used in the CAPM, "beta". William F. Sharpe also won a Nobel Prize in economics in 1990, for his role in the creation of the CAPM. Outside of rate regulation, CAPM is far more widely used than DCF.

While DCF does seem to be the most widely used method in rate regulation, other commissions have relied on the CAPM to some degree in cost-of-service proceedings. In 1992, for example, the New York Public Service Commission established proceedings to investigate whether the DCF approach used to estimate the cost of equity in proceedings for electric utilities should be modified. In June of 1993, a consensus was reached among all parties. The group concluded that the cost of equity would be determined by equally weighting the results from three methods, the CAPM, the DCF and the Comparable Earnings method. Thus, while this Commission may prefer to use the DCF method in connection with the regulation of telephone companies, we urge the Commission to look to the CAPM for guidance in determining the rate of return for cable television companies, since the DCF method cannot reasonably be applied in this industry.

---

[16] *See* Richard A. Brealey and Stewart C. Myers, 1991, *Principles of Corporate Finance* (4th ed.), New York: McGraw-Hill, Inc., Chapter 8; Thomas E. Copeland and J. Fred Weston, 1983, *Financial Theory and Corporate Policy* (2nd ed.), Reading: Addison-Wesley Publishing Company, Chapter 7; and Stephen A. Ross, Randolph W. Westerfield and Jeffrey A. Jaffe, 1990, *Corporate Finance* (2nd ed.), Boston: Richard D. Irwin, Inc., Chapter 9.

To measure the relative risk of a company with publicly traded stock, it is possible to calculate the "beta" of the stock in question. Beta is a measure of the "systematic" or "undiversifiable" risk of a stock — the extent to which returns on that stock are correlated with returns on other stocks. The basic idea behind beta is that risks that cannot be diversified away in large portfolios matter more than those that can be eliminated by diversification.[17]

An analogy may be helpful. An individual playing roulette can win or lose a fortune. The owners of the roulette wheel bear little risk from roulette, however. Over time, the losses on one night are more than balanced by the gains on other nights. And if there are many wheels in the casino, elimination of the casino's exposure to the risks of roulette proceeds that much faster. However, that does not mean gambling casinos are risk-free for the owners. The casino owners' risk comes not from roulette but from the state of the economy. They do well when people feel rich and come to gamble, while in recessions they do poorly as people stay at home or gamble less when they do come. Beta is a measure of the second kind of risk, that caused by market-wide factors that cannot be eliminated through diversification, but that nonetheless affect some firms more than others.

Nor can an undiversified investor expect compensation for the additional risk he or she might bear by virtue of being undiversified. For example, suppose an investor bet everything on one stock. That investor could be exposed to enormous risk, far more than an investor who put the same amount of money in a well diversified portfolio of many stocks. Yet there is only one price for a given stock. If that price were especially low, so as to offer a premium rate of return for an undiversified investor, diversified investors would see it as a bargain and snap it up.

---

[17] Beta is the risk measure that underlies the Capital Asset Pricing Model. However, beta is a general risk measure, while the CAPM is only one particular model of how risk relates to return. Thus, one could accept beta as a risk measure without necessarily accepting the CAPM as the way risk and required returns are related.

Their buying would drive up the price until it offered no premium for risk exposure that well diversified investors can eliminate.

While a substantial amount of risk can be eliminated through diversification, the amount of risk that still remains is also substantial. Many factors that make a particular stock go up or down also affect other stocks (although generally to different degrees). Examples include the state of the economy, the balance of trade, and inflation. Thus some risk is "non-diversifiable" or "systematic." This is what beta measures.

By definition, a stock with a beta equal to 1.0 has average non-diversifiable risk. It goes up or down by 10 percent on average when the market goes up or down by 10 percent. Stocks with betas above 1.0 exaggerate the swings in the market. Stocks with betas of 2.0 tend to fall 20 percent when the market falls 10 percent, for example. Stocks with betas below 1.0 are less volatile than the market. A stock with a beta of 0.5 will tend to rise 5 percent when the market rises 10 percent.

The usual approach to calculate beta is a statistical comparison of the sensitivity of a stock's (or a portfolio's) return to the market's return. Many investment services report betas, including Merrill Lynch's quarterly *Security Risk Evaluation* and the *Value Line Investment Survey*. We calculate betas by statistical regression to determine the relationship between the excess (positive or negative) of the return on the stock over the risk-free rate and the excess of the return on the Standard & Poor's 500 stock index over the risk-free rate.[18]

---

[18] It should be noted that the degree to which beta is correlated with required rates of return was recently a subject of some controversy. However, the situation today is that use of beta as *one* key measure of relative risk remains a widely used and economically sound practice.

B. Special Problems In Setting A Regulated Cost of Capital In Cable Television.

The standard goal for cost-of-service regulation is to set regulated rates so investors *expect* to earn the cost of capital. "Expect" is used here in the statistical sense of the term, to imply "expect as the probability-weighted average over all possible outcomes." The underlying economic premise of this approach is that the cost of capital is the return investors could expect in competitive equilibrium. However, the actual legal language is less clear on what should happen when the industry in question is a rapidly growing one, rather than one in competitive equilibrium.

Bluefield Waterworks & Improvement Co. v. Public Service Commission, 262 U.S. 678 (1923), held that a regulated firm

> is entitled to such rates as will permit it to earn a return on the value of the property which it employs . . . equal to that generally being made . . . on investments in other business undertakings which are attended by corresponding risks and uncertainties.[19]

Federal Power Commission v. Hope Natural Gas, 320 U.S. 591, 601-602 (1944), held that equity holders in a rate-regulated firm should find that their return is "commensurate with returns on investments in other enterprises having corresponding risks", and "sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and to attract capital."[20]

The capital attraction standard is met if investors truly expect to earn at least their cost of capital. However, the "corresponding" risks and uncertainties in rapidly growing competitive industries differ from those in competitive equilibrium. We

---

[19] *Id.* at 692.

[20] 320 U.S. 591 (1944) at 603.

have discussed these problems elsewhere.[21] Here, we assume that the appropriate target under the new cost-of-service regulatory approach will be an expected rate of return equal to the cost of capital.[22]

Another issue relevant to the cost of capital for many companies in the cable industry is liquidity. The stocks of many cable companies are privately held, and, therefore, illiquid when compared to publicly traded stocks of firms in the S&P 400 and of large telephone companies. The precise value of liquidity is hard to quantify; it is still one of the unsolved problems in finance.[23] We do know, however, that illiquid assets deserve *some* kind of liquidity premium. Thus, all else equal, privately held assets will have a higher cost of capital than will publicly traded assets.

Moreover, many cable companies are small. There is some evidence that suggests that size matters to the cost of capital. Stocks of smaller companies, "small stocks," seem to require a premium. Thus, all else equal, small stocks may have a higher cost of capital than large stocks.

C. Effect of Debt on the Overall Cost of Capital

To assess properly the risk of cable companies over time or relative to other industries, care must be taken to control for any differences in capital structure. Some of the concerns the Commission raised about use of data on publicly traded

---

[21] *See* Kolbe and Vitka, 1993, and Kolbe and Borucki, 1993; for a separate issue that can raise similar concerns, *see also* Kolbe and Tye, 1991 and 1992, and Kolbe, Tye and Myers, 1993, all of which are cited in Appendix A.

[22] Rapid growth can create problems in cost of capital estimation, too. For example, the "present value" formula that underlies the DCF approach does not work for options (such as puts and calls on stocks), and rapid growth implies the existence of option-like opportunities. *See* generally, Brealey and Myers, 1991, *op. cit.* at Chapters 20 and 21 for discussion of options and option valuation techniques.

[23] *See* Brealey and Myers, *op. cit.* at 923.

cable companies can be traced directly to comparisons that do not control for capital structure differences. Accordingly, this section covers the relevant principles, as background for the later analyses.

Outside the regulated sector, there is no observable link between differences in the capital structures of firms within an industry and the prices those firms charge consumers. Moreover, there is no evidence that the majority of unregulated companies seriously pursue theoretically "optimal" capital structures, or that operating at those capital structures, if they could be found, would confer any significant competitive advantage. Yet capital structure can be a contentious issue in regulatory settings.

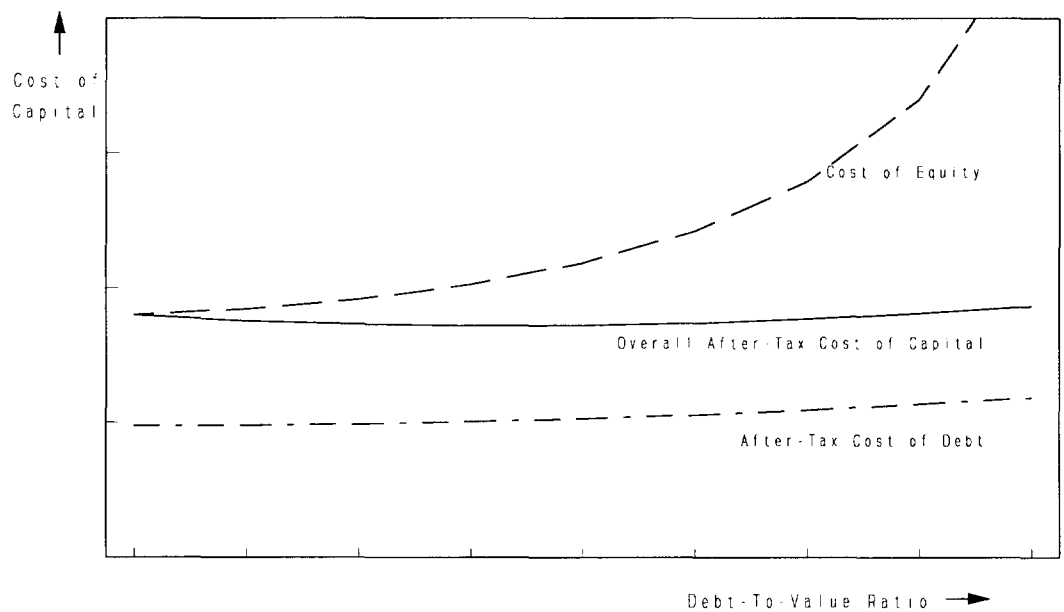
In our experience, regulators may pay capital structure both too much and too little attention. They can pay too much attention to the overall financing mix and to financing tactics, and too little to the relationship between financial leverage and the cost of equity capital. A fixed overall cost of capital means that the cost of *equity* and the fair rate of return to equity increase with the debt-to-equity ratio. Therefore, differences in leverage have to be accounted for when estimating equity costs or comparing equity returns.

Rates charged customers, however, depend on the *overall* cost of capital, which does not change materially as capital structure shifts. A company that attempts to lower its overall cost of capital by using more "low-cost" debt will increase the financial risk borne by stockholders and drive up the cost of equity.

This is not just theory. It is consistent with how unregulated companies actually behave. There is no evidence that companies which "lever up" gain any material competitive advantage. In fact it is the other way around: weak players generally end up with high debt ratios. Managers may give lip service to target debt ratios, as if there were a discernable optimum, but they tolerate extended excursions from

those targets. There is no reason regulators should not be equally relaxed about debt ratios, provided they are in a reasonable range, and focus their efforts elsewhere.

Figure 2
Cost of Capital As Debt Changes



The reason capital structure is unimportant in this context, if properly analyzed, is illustrated generically in Figure 2. The overall after-tax cost of capital (*i.e.*, the weighted average of the cost of equity and the *after-tax* cost of debt) declines initially as debt is added, because the fact that interest payments are deductible at the corporate level is valuable to the firm. However, the corporate tax advantage on debt is offset to a degree by a personal tax disadvantage to debt. Moreover, too much debt can lead to financial distress. Thus, the overall after-tax cost of capital and the cost of debt both eventually begin to climb as debt is added.

The net effect is that the *overall* after-tax cost of capital is not very sensitive to the debt ratio.[24] As noted above, this conclusion is reinforced by actual corporate behavior. Capital structures vary widely among unregulated firms in the same industry, and often the most profitable (and hence presumably best-managed) firms have the least debt. If the overall after-tax cost of capital declined markedly as debt was added, one would expect to see exactly the reverse.

The cost of equity is sensitive to the debt ratio, however. Debt adds risk for equity holders at an ever increasing rate. The reason is that equity holders must bear the bulk of the uncertainty in the firm's operating earnings (because debt payments are fixed and, absent severe financial distress, are made before equity holders get any money) with an ever-shrinking share of the total capital of the firm. For example, if *operating* earnings change by plus or minus 10 percent of total capital, *equity* earnings also change by plus or minus 10 percent with 100 percent equity. However, equity earnings would change more with less equity: by plus or minus 20 percent with 50 percent equity, by plus or minus 40 percent with 25 percent equity, and by plus or minus 100 percent with 10 percent equity.[25] The result is the exponentially growing cost of equity curve in Figure 2.

This analysis shows that it is reasonable for regulators to focus on the overall cost of capital of cable companies, rather than trying separately to estimate the costs of debt and equity capital and then trying to estimate what mix of debt and equity is

---

[24] The precise shape of the overall cost of capital line in Figure 2 is unknown. Thus, it may be less symmetrical, staying flat or even declining slightly over broad middle range and only turning up sharply further to the right than depicted. Also, the shape may vary somewhat from industry to industry. However, the basic point that capital structure does not matter much except at the extremes remains unaffected by the precise shape.

[25] Of course, at very low equity ratios, bondholders end up bearing some of the risk of operating earnings variability, too. However, this does not affect the basic point.

most appropriate. In practical terms, the market-value[26] weighted-average of the after-tax cost of equity and the pre-tax cost of debt can reasonably be regarded as a constant. This quantity is the all-equity cost of capital used in our analysis.

III. RISKS THAT CABLE TELEVISION COMPANIES FACE

A. General Description of the Factors that Contribute to Risk

Modern finance classifies risk into two major components, business risk and financial risk. Business risk is the uncertainty in returns that the firm would face if it were financed entirely by equity. It depends on the uncertainty of the operating earnings (*i.e.*, after-tax net income plus after-tax interest expense) of a company. The all-equity cost of capital corresponds to the cost of capital due only to the business risk of the company.

Financial risk depends on the extent to which shareholders have borrowed to finance the company's assets and operations. (The basis of financial risk was discussed immediately above in the discussion of the effect of debt: debt magnifies the impact of business risk on shareholders.)

Business risk is in some sense more fundamental, since companies in the same industry often have widely varying capital structures (and hence very different amounts of financial risk) but essentially the same business risk. Business risk encompasses all the operating factors which collectively increase the probability that expected future income flows accruing to investors may not be realized, because of the fundamental nature of the firm's business. Business risk is due to

---

[26] The cost of equity capital depends on the relative market values of debt and equity for a given level of overall risk. Therefore, when calculating the after-tax weighted-average cost of capital it is necessary to use market-value weights. Otherwise the final estimate will be wrong, especially for unregulated companies where historical book costs generally lack meaning.

sales volatility and operating leverage. Sales volatility refers to the uncertainty in the demand for the firm's products due in part to external non-controllable factors, such as the basic cyclicality of the firm's products, the products' income and price elasticities, the amount of competition, the availability of product substitutes, the risk of technological obsolescence, the degree of regulation, and the conditions of the labor and raw materials markets.

The cost structure of a firm contributes to business risk, too. If all production costs are variable, then operating income varies proportionately to sales variability. However, if a large portion of the costs are fixed, operating income is far more volatile than sales. The tendency of fixed costs to magnify the variability of operating income is referred to as "operating leverage." Operating leverage thus adds business risk for essentially the same reason that financial leverage (*i.e.*, use of debt) adds financial risk.[27]

B. Description of Factors Which Contribute to the Risk of Cable Television Companies

Concerns abound for the business risks of the cable industry in a newly regulated, yet competitively affected, world.[28] Very large investments (such as fiber optic cables) are under consideration, which could be used for both regulated and unregulated cable service. The likelihood and security of recovery of and on such

---

[27] All else equal, firms with less business risk have a greater capacity to use debt. However, the wide variance in capital structure among firms in the same industry implies inferences cannot be made in the other direction. That is, while *a priori* knowledge that business risk is lower can be used to say debt *capacity* is higher, even that does not permit one to say *actual debt* is higher, let alone the reverse. In any particular case, a high debt ratio may result from a host of company- or industry-specific factors quite unrelated to business risk.

[28] The threat of current and future competition may arise in many forms, from over-the-air TV, to wireless cable, to alternative cables into the home from local telephone companies, to other sources of news and entertainment entirely.

investments is a question this Commission's actions will help determine.[29] The ultimate answer to the question will affect the well-being of cable customers and investors alike. At the very least, the resulting uncertainty will affect access to capital markets (*e.g.*, it will reduce the debt available at any given price until the uncertainty is resolved).

The inherent uncertainty associated with new regulation is compounded by some very unusual features of that regulation. First, this Commission has considered two regulatory standards, and it is not yet clear how the two will interact. Second, there are many potential jurisdictions, and it is not yet clear how the jurisdictions will interact. Third, cable franchises very often have a finite term. While refusal to renew a franchise may require a payment of the current value of existing assets, there will tend to be debate and uncertainty over just what that value is. Thus, franchise owners now face downside risk at the time of franchise renegotiation with an upside newly limited by rate regulation.

C. Regulated Cable Service is Riskier than Regulated Telephone Service

Regulated cable service has characteristics which indicate that it is riskier than regulated telephone service. First, there tend to be more realistic substitutes to regulated cable service. Without access to cable, for example, there may still be access to over-the-air broadcast stations. However, if a person is without telephone

---

[29] Investment analyst reports confirm such concerns. For example:

"Another concern we have is the uncertainty--perhaps even lengthy periods of uncertainty--that individual cable operators will face in coping with rate regulations." (Merrill Lynch High Yield Media Update, May 10, 1994)

service, there are few obvious alternatives that provide immediate communication at a distance.[30]

Moreover, telecommunication companies may have easier access to capital and more expertise in the areas where competition is driving cable companies to compete. Telephone companies, to name just one important factor of concern to investors, *pay dividends*. The greater security of telephone company investments is confirmed by the following quotes from a J.P. Morgan Analyst Report of October 18, 1993.

> "In most cases the cable company is at a disadvantage unless it has access to capital and telco expertise so that it can play on a level playing field with the phone companies."
>
> "...the cable industry is generally highly leveraged and will not have available the free cash flow to fund the projects; in some cases operators will have difficulty funding extensive capital programs."
>
> "Yet it is significant that the two largest operators, Tele-Communications and Time Warner, which were also the strongest financially, both decided to enter alliances with telephone companies that could provide capital to finance expansion."[31]

Finally, investors in telephone companies know the rules of the game to a far greater extent than cable investors do. Indeed, no one is quite sure what the regulatory and statutory outcome will be for cable companies. Telephone company investments simply present far less uncertainty.

---

[30] The Massachusetts Department of Welfare makes an allowance for telephone service in its family budgets, for example, but no such allowance is made for cable service.

[31] The fact that the TCI-Bell Atlantic deal has been called off does not affect the basic point: telephone companies have enormous financial resources compared to cable companies.

IV. RESULTS

A. S&P 400 Industrials

Our analysis of the S&P 400 proceeded as follows. First we estimated the cost of equity for all dividend paying companies in the S&P 400 using risk positioning and DCF methods. Next we estimated the cost of equity using the risk positioning methods for the non-dividend paying companies in the S&P 400. These estimates were then compared to the risk positioning cost of equity estimates for the dividend paying companies in the S&P 400.

1. Methodology

A complete description of the methodologies and the data employed in our analyses are described in Appendix B. Briefly, we estimated a constant-growth DCF model and variable-growth versions of the DCF model.[32] The constant-growth method assumes that forecasted earnings, dividends, and assets *all* grow at the same constant rate forever. This is the standard model employed by commissions to estimate a DCF cost of equity. Forecasted earnings growth rates were employed and are preferable to historical growth rates. The DCF model is a forward looking model and as such, should employ investor's expectations of future growth. Earnings forecasts from the Institutional Brokers Estimate System (I/B/E/S) were employed in this analysis.

---

[32] We examined two alternative variable growth models, each relying on a different terminal growth assumption. One model assumes long-term growth is equal to the I/B/E/S mean five-year earnings growth rate forecast. The other model assumes a terminal growth rate equal to the derived rate for years three through five. While there is no objective reason to chose one over the other, the variable-growth model using the derived growth rate generated some highly improbable results (negative costs of equity in some cases). We have chosen here to report the estimates from the variable-growth model using the I/B/E/S mean five-year forecast. The results for the other model are shown in Appendix B.

Forecasted growth rates are obviously not constant forever. Variable-growth DCF models, which distinguish near- and longer-term growth rates, should give more accurate estimates of the cost of equity. Use of such models guards against naive projection of short-run earnings changes into the indefinite future. However, even variable-growth models must assume some growth rate five years into the future, for example, which will be constant forever thereafter.

I/B/E/S reports averages of analysts' earnings forecasts for one, two and five-year horizons. This allows calculation of forecasted earnings growth rates for years one, two and three to five. Forecasted dividends per share were assumed to grow at a constant long-term growth rate after year five. The cost of equity is the expected rate of return to an investor purchasing stock at the current market price, receiving the forecasted dividend stream to year five, and then selling for the year-five stock price. That stock price is the present value of forecasted dividends from year six on based on the formula that underlies the constant-growth DCF model.

The risk positioning methods we rely on are the widely used CAPM and a variant which reflects the empirical relationship found between beta and the cost of equity. The CAPM is a theory of capital market equilibrium that yields a simple formula for the cost of equity.

$$r = r_f + \beta \, x \, MRP$$

where r is the cost of equity for the investment in question, r_f is the risk-free interest rate, β is the investment's beta, and MRP is the market risk premium.

Empirical research has long shown that the CAPM tends to overstate, to a modest degree, the actual sensitivity of the cost of equity to beta. Low-beta stocks tend to have higher risk premia than predicted by the CAPM and high-beta stocks tend to

have lower risk premia than predicted. Thus, empirical studies have found that while the cost of capital is positively related to beta, mathematically the linear relationship is not as steep as predicted by the CAPM. We estimate the cost of capital with a model that reflects this empirical result, which is identified as the "ECAPM" (for *Empirical* CAPM).

Since the cost of equity increases with leverage, we adjust explicitly for capital structure, *i.e.*, the proportion of debt and equity of the company. We present actual cost of equity estimates and the corresponding all-equity cost of capital estimates, that is, the cost of equity the company would face if it were entirely financed by equity. This cost of equity reflects only the company's business risk.

2. Cost of Equity Estimates Obtained from Risk Positioning Estimates are Comparable to DCF Cost of Equity Estimates

The mean and median risk positioning and DCF cost of equity estimates for the dividend paying companies in the S&P 400 are reported in Table 1. The sample was partitioned into equally weighted quartiles based on a ranking by the corresponding cost of equity. Thus, the composition of companies in each quartile may vary by methodology. For example, some of the companies which have CAPM cost of equity estimates in the fourth quartile, may have DCF estimates in the third quartile. However, the company composition of the quartiles is the same for both the CAPM and ECAPM methods.

Table 1 **Risk Positioning *vs.* DCF** **Cost of Equity Estimates** **S&P 400 Dividend Paying Companies***				
	CAPM	*ECAPM*	*Constant Growth DCF*	*Variable Growth DCF*
4th Quartile	17.90 (17.56)	16.86 (16.60)	19.32 (17.85)	18.68 (17.79)
3rd Quartile	15.19 (15.13)	14.79 (14.75)	15.59 (15.55)	15.55 (15.51)
2nd Quartile	13.42 (13.40)	13.44 (13.42)	13.96 (13.97)	13.94 (13.94)
1st Quartile	10.35 (10.98)	11.09 (11.57)	11.39 (11.97)	8.43 (11.72)
Overall Average	14.23 (14.27)	14.06 (14.09)	15.08 (14.75)	14.17 (14.63)
* Medians are reported in parentheses below mean estimates.				

The median cost of equity estimates for the S&P 400 are fairly robust across methodologies. The DCF methods consistently produce slightly higher estimates. As would be expected, the means and medians of each method for the second and third quartiles are close. This is because there are no real outliers for these two "middle quartiles", unlike in the fourth quartile (where it is possible to have some extremely high cost of equity estimates) and in the first quartile (where it is possible to have some extremely low cost of equity estimates).

The corresponding all-equity cost of capital estimates for the dividend paying companies of the S&P 400 are summarized in Table 2. These figures represent the cost of equity the company would receive in the absence of any financial risk. The estimates suggest there is considerable variability in the business risk of the companies in the S&P 400 which pay dividends. The average all-equity cost of capital for companies in the fourth quartile is at least 5 to 6 percentage points higher than the average all-equity cost of capital for the first quartile.

Table 2 Risk Positioning *vs.* DCF All-Equity Cost of Capital Estimates S&P 400 Dividend Paying Companies*				
	CAPM	*ECAPM*	*Constant-Growth DCF*	*Variable Growth DCF*
4th Quartile	16.36 (16.07)	15.56 (15.29)	17.86 (16.68)	17.56 (16.67)
3rd Quartile	13.63 (13.56)	13.37 (13.32)	14.36 (14.37)	14.34 (14.36)
2nd Quartile	12.08 (12.13)	12.11 (12.12)	12.80 (12.81)	12.75 (12.80)
1st Quartile	9.80 (10.25)	10.31 (10.63)	10.57 (10.84)	8.94 (10.74)
Overall	12.98 (12.76)	12.85 (12.70)	13.91 (13.60)	13.41 (13.54)
* Medians are reported in parentheses below mean estimates.				

3. The Cost of Equity for Non-Dividend Paying Companies in the S&P 400 is Higher than the Average Cost of Equity for Dividend Paying Companies in the S&P 400

A surrogate group which can be used to provide some insight as to what the cost of equity is for non-dividend paying companies naturally falls out of the S&P 400. Approximately 14 percent of the companies in the S&P 400 for which sufficient data were available to estimate risk positioning cost of equity estimates do not pay dividends.

At the outset, we identified rapid growth as a reason not to pay dividends. Cable companies are characterized as fast growing companies with much of their value coming from growth opportunities.

The non-dividend paying companies in the S&P 400 have similar characteristics. This view is supported by the I/B/E/S earnings growth forecasts. The average I/B/E/S five-year earnings forecast growth rates for the non-dividend and dividend paying companies are presented in Table 3. The average growth rate for the non-dividend paying companies falls above the growth rates for the fourth quartile of the dividend paying companies in the S&P 400. This evidence suggests that the non-dividend paying companies of the S&P 400 lie in the upper part of the growth spectrum, and hence the upper part of the risk spectrum, of the S&P 400.

Table 3
I/B/E/S Mean Five-Year Earnings Growth Rate Forecasts
Non-Dividend and Dividend Paying Companies
(S&P 400 Industrials)*

	Mean (%)
Non-Dividend Paying Companies	15.4
Dividend Paying Companies	
Fourth Quartile	13.4
Third Quartile	12.4
Second Quartile	11.4
First Quartile	11.8
Overall	12.2

* The quartiles were determined by ranking the CAPM all-equity cost of capital estimates.

Of course, direct estimation of the cost of equity of the various groups via the risk positioning method provides still more direct evidence of relative risk. The cost of equity estimates for the non-dividend paying companies in the S&P 400 are summarized in Table 4. The risk positioning cost of equity estimates for the dividend paying companies are also shown. The average cost of equity for non-

dividend paying companies in the S&P 400 is *higher* than the average cost of equity for dividend paying companies by 2 to 3 percentage points.

Table 4

Risk Positioning Cost of Equity Estimates
Dividend Paying *vs.* Non-Dividend Paying Companies
(S&P 400 Industrials)

	CAPM (%)		ECAPM (%)	
	Mean	*Median*	*Mean*	*Median*
Non-Dividend Paying Companies	17.27	16.51	16.38	15.80
Dividend Paying Companies	14.23	14.27	14.06	14.09
Difference	3.04	2.24	2.32	1.71

The corresponding all-equity cost of capital estimates, which control for differences in leverage, corroborate our findings. These results are presented in Table 5. The average all-equity cost of capital for non-dividend paying companies in the S&P 400 is *higher* than that of the dividend paying companies by 1.3 to 2.0 percentage points.

Table 5

All-Equity Cost of Capital Risk Positioning Estimates
Dividend Paying *vs.* Non-Dividend Paying Companies
(S&P 400 Industrials)

	All-Equity CAPM (%)		All-Equity ECAPM (%)	
	Mean	*Median*	*Mean*	*Median*
Non-Dividend Paying Companies	14.99	14.55	14.38	13.95
Dividend Paying Companies	12.98	12.76	12.85	12.70
Difference	2.01	1.79	1.53	1.25

Additionally, we note that of all the companies in our S&P 400 sample, dividend and non-dividend paying, only four of the 358 companies had negative book values, and (not surprisingly) the cost of equity estimates for these fall into the upper two quartiles of the S&P 400 all-equity estimates for the dividend paying companies.[33] It is not at all uncommon, however, for cable companies to have negative book values. Indeed, four of the eight close-to-pure play cable companies considered in this report had negative book values. The four companies in the S&P 400 which had negative book values do not pay dividends.

It is necessary to look at the all-equity cost of capital estimates for the dividend paying companies in the S&P 400 in greater detail to understand what subset of these companies is of comparable business risk to the non-dividend paying group. Table 6 presents summary statistics by quartile for the all-equity risk positioning estimates of the dividend paying companies in the S&P 400.

[33] The average all-equity CAPM cost of capital estimate for these four companies is 14.4 percent; the average overall all-equity CAPM cost of capital estimate is 13.7 percent.

Table 6

All-Equity Risk Positioning Estimates by Quartile
Dividend Paying Companies
(S&P 400 Industrials)

	All-Equity CAPM (%)				All-Equity ECAPM (%)			
Quartile	*Max*	*Min*	*Mean*	*Median*	*Max*	*Min*	*Mean*	*Median*
Fourth	19.99	14.62	16.36	16.07	18.28	14.23	15.56	15.29
Third	14.58	12.76	13.63	13.56	14.18	12.70	13.37	13.32
Second	12.75	11.38	12.08	12.13	12.68	11.46	12.11	12.12
First	11.35	3.82	9.80	10.25	11.45	5.81	10.31	10.63

The mean and median all-equity cost of capital estimates for the non-dividend paying companies falls between the range of all-equity cost of capital estimates of the third and fourth quartiles of the S&P 400 dividend paying companies. This evidence suggests that the business risk of non-dividend paying companies in the S&P 400 is comparable to the business risk of companies in the top two quartiles of the S&P 400 dividend paying companies.[34]

4. High Financial Leverage is Not Necessarily Indicative of Low Business Risk

In the Cost-of-Service Order the Commission states, "We believe the cable industry attained its current high levels of debt financing largely on the basis of its low business risk."[35] However, as we discussed in Section III, other factors can contribute to a firm's ability to carry leverage. *A priori* knowledge of low business risk permits an inference about debt *capacity* (although not about actual debt ratios), but the wide range of capital structures for companies in the same business

---

[34] The risk positioning cost of equity estimates (estimated at actual capital structure) for the non-dividend paying companies also lie between the top two quartile cost of equity estimates (estimated at actual capital structure) for the S&P 400 dividend paying companies. *See* Tables 1 and 4.

[35] Cost of Service Order at ¶ 177.

precludes meaningful inferences about business risk based on observed capital structures.[36] To explore this issue, we examined the relationship between leverage and business risk (as measured by the all-equity cost of capital) of the S&P 400 dividend paying companies compared to that of the non-dividend paying companies in the S&P 400.

The range and average market debt-to-value ratios for these companies are presented in Table 7. The pattern of increasing mean debt-to-value ratios corresponding to decreasing business risk for the dividend paying companies shows that firms with higher business risk have some tendency to have lower average debt-to-value ratios. This probably corresponds with the fact that, on average, these firms have lower debt capacity. But the reverse does not hold: the non-dividend paying companies, which we already know to be highly risky, have *higher* debt-to-value ratios than all but the lowest risk quartile of the dividend-paying stocks in the table.[37] Moreover, as we predicted above, there is a wide range of capital structures within each group. Even the narrowest range, for the riskiest quartile of dividend-paying stocks (0.0 percent to 36.7 percent), shows *twice* the difference in mean debt ratios between the highest and lowest quartiles (9.2 percent to 27.0 percent).

---

[36] In terms of basic logic, the fact that I can say, "If I'm in Philadelphia, then I'm in Pennsylvania" does not mean I can say, "If I'm in Pennsylvania, then I'm in Philadelphia".

[37] That is, the average market debt-to-value ratio for companies which do not pay dividends is 23.6 percent, which lies between the first and second quartile means of the dividend paying stocks *despite* the fact that the business risk of the no-dividend companies lies between the risk means of the third and fourth quartiles of the dividend paying companies. (Compare Tables 5 and 6 above.) There are many possible explanations for this, ranging from random chance to a possible tendency of companies that are seeking cash for growth to borrow more.

Table 7 1993 Market Debt-to-Value Ratio Non-Dividend and Dividend Paying Companies (S&P 400 Industrials)[38]			
	Minimum (%)	*Mean (%)*	*Maximum (%)*
Non-Dividend Paying Companies	0.0	23.6	87.4
Dividend Paying Companies			
Fourth Quartile	0.0	9.2	36.7
Third Quartile	0.5	18.2	39.1
Second Quartile	0.0	22.6	63.5
First Quartile	0.0	27.0	73.7

These data confirm that actual capital structures are only very tentatively correlated with business risk. This demonstrates the logical fallacy in predictions of business risk based on observed capital structure.

Together, the facts in this section suggest that the non-dividend paying companies of the S&P 400 are riskier on average than the dividend paying companies of the S&P 400. Moreover, the business risk (again, as measured by the all-equity cost of capital) of the non-dividend paying companies lies between the average business risk of the dividend paying companies in the upper two quartiles of the S&P 400. Also, the cost of equity estimates (estimated at actual capital structures) of the non-dividend paying companies falls between the cost of estimates of the top two quartiles of the S&P 400 dividend paying companies. Finally, actual capital structures are only weakly correlated with business risk and cannot validly be used to infer relative business risk, particularly for non-dividend paying companies.

---

[38] These results are based on a sort of the all-equity cost of capital CAPM estimates. Ranges and means for the capital structure based on sorts of the all-equity cost of capital for the ECAPM and DCF methods produced similar results.

B. The Sample of "Pure Play" Cable Companies

1. The Sample

The overall cost of capital for a company or a division of a company depends on the risk of the business in which the entity is engaged. The objective in these proceedings is to determine the cost of capital for the cable television business and hence to assess the risk of the cable television business. Thus, the ideal sample is a number of companies that are publicly traded "pure plays" in the cable television business. Publicly traded firms are required because the best way to infer the cost of capital is to examine evidence from capital markets on companies in the given line of business.

The companies we examine in this paper are the same as those we identified in our previous report to the Commission. Briefly, we identified a large set of publicly traded cable corporations. These corporations were either listed in the *Value Line Investment Survey* or identified as key cable stocks in the February 12, 1993 edition of "Cable Television Investor Data Roundup" published by Paul Kagan Associates, Inc. Data on revenue from cable system operations was collected for this sample from annual reports or via phone calls to the company if the data were not reported in the annual reports. All companies with revenue from cable systems less than 60 percent were eliminated from the sample. In most cases, revenues from cable service are well in excess of 80 percent. A list of the companies, their cable television revenue and other relevant data are found in Table 8.